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EXAMINER	
SHEETS, ELIJAH M	

ART UNIT	PAPER NUMBER
2609	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/726,019	RISER ET AL.	
	Examiner	Art Unit	
	Eli M. Sheets	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because Fig. 4 does not indicate an item 55, as stated in specification (Page 11, line 2). In addition, label 55 is previously used in Fig. 2 to indicate a human eye. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 27 recites the limitation "the optical fiber being of material with a refractive index greater than the refractive index of the LED material". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> The factual inquiries set forth in **Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966)**, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: ***(See MPEP Ch. 2141)***
>
> a. Determining the scope and contents of the prior art;
> b. Ascertaining the differences between the prior art and the claims in issue;
> *c.* Resolving the level of ordinary skill in the pertinent art; and
> *d.* Evaluating evidence of secondary considerations for indicating obviousness or nonobviousness.

5. Claims 1, 2, 12, 20, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weissman et al. (US 5,984,477) in view of Guy (US 2003/0219207 A1), and further in view of Zavracky et al. (US 5,673,059).

Regarding claim 1, Weissman discloses a helmet mountable display with housing (support structure supported by the head of the user), which includes a cube (viewing portion facing one of the eyes of the user) on which desired image is displayed (cube, Fig. 3) where the spatial light modulator is illuminated by a light source (LED generating light), and the light source might comprise an optic fiber cable relaying light (fiber optic

cable receiving light, transmitting light to reflective display) from a lamp (LED) to lens (Col.2, lines 24-28). In addition, Weissman discloses that the light source passing through the entry polarizer is directed by the beam splitter onto the liquid crystal device (reflective display) and substantially all of the light reflected from the the liquid crystal device (reflected by the reflective display) is directed by the beam splitter (optics receiving said image projected image to the viewing portion) onto the screen (to project said image, so as to be viewed by the user) (Col. 2, lines 2-5). Weissman fails to disclose that the lamp (LED) is bonded to first plastic optical fiber. However, Guy discloses a fiber optic LED illuminator, wherein the light guide (plastic optical fiber) may be bonded to light emitting surface of the solid state light source (LED) (Paragraph [0021], lines 14-16). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Weissman and Guy for the benefit of insuring the light guide may be placed in intimate contact with the light emitting surface so that light emitted from the light emitting surface of the solid state light source may be captured by the light guide and is transmitted within the light guide by total internal reflection (Paragraph [0021], lines 8-14). However, neither Meissman nor Guy specifically disclose the use of LEDs as light sources in a heads-up display system. Zavracky, however, teaches an embodiment of a LCD projection system (Fig. 19, item 1300) using color sequencing to produce a full-color image. The system includes three monochromatic LED point or line sources (items 1350, 1352, 1354) which produce red, green and blue light, respectively (Col. 18, lines 29-33). Therefore, viewing all references as a whole, it would have been obvious to one of ordinary skill in the art at the time of

invention to combine the teachings of Weissman, Guy, and Zavracky for the obvious benefit of LCD full-color display.

Regarding claim 2, Weissman discloses (in Fig. 3) that the invention may include a helmet attachment, and a rotation point for a visor-type viewing screen (see Fig. 2, dotted lines, which represent the visor-type viewing screen).

Regarding claim 12, Guy teaches that in the coupling assembly the light guide is placed next to the light emitting surface of the solid-state light source and the light guide is bonded to the light source (bonding an end of the associated optical fiber to said surface) (Paragraph [0009], lines 4-6). In addition, Guy teaches that the LED's plastic dome (Fig. 1, item 114) may be drilled (cut) to form a hole (item 116) of proper dimensions to accept light guide (optical fiber) (Paragraph [0023], lines 3 and 4).

Regarding claim 20, Weissman teaches that for "see through" capability, the spherical mirror is a partially reflecting (transparent) mirror and lens (Fig. 1, item 19) is added to provide a "see through" magnification of unity (Col. 2, lines 64-66). Since the image is visible to the user through the mirror's plane, and it is only partially reflecting, the image and the background are visible through the same plane, thus superimposing the image on the background (view therethrough).

Regarding claim 24, Guy teaches that in the coupling assembly the light guide is placed next to the light emitting surface of the solid-state light source and the light guide is bonded to the light source (bonding an end of the associated optical fiber to said surface) (Paragraph [0009], lines 4-6). In addition, Guy teaches that the LED's plastic dome (Fig. 1, item 114) may be drilled (cut) to form a hole (item 116) of proper dimensions to accept light guide (optical fiber) (Paragraph [0023], lines 3 and 4). In

addition, Guy discloses that the LED die (surface) can be cut (configured) to a shape that matches the light guide or fiber bundle (transmits light from the LED more efficiently to the optical fibers bonded thereto) (Paragraph [0022], lines 16-18).

6. Claims 3-11 and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weissman et al. (US 5,984,477) in view of Guy (US 2003/0219207 A1), and further in view of Zavracky et al. (US 5,673,059) and Reynolds (US 3,825,336).

Regarding claims 3 and 4 neither Weissman nor Guy disclose a second or third LED bonded to a second or third plastic optical fiber receiving light from the second or third LED, said first and second (and third) optical fibers having a combined end portion transmitting the light from the first and second (and third) LEDs combined together. Reynolds discloses a variable color lighting source and mixing device wherein the mixing devices comprise first, second and third incoherent bundles of individual optic fibers, each bundle having an input end and an output end. The input end of each of the three fiber optic bundles is optically coupled to one of the three primary color light sources (LEDs). The output ends of the three bundles are joined together by interweaving the individual optic fibers forming the bundles to form a common composite output (combined output) end of the mixing device (Col 2, lines 25-33). Therefore, viewing all references as a whole, it would have been obvious to one skilled in the art at the time of invention to combine the teachings of Weissman, Guy, Zavracky, and Reynolds for the benefit of utilizing a highly efficient fiber optic light-mixing device for producing a composite color (Col. 2, lines 21-24).

Regarding claim 5 and 6, Zavracky teaches that his system includes three monochromatic LED point or line sources (items 1350, 1352, 1354), which produce red, green and blue light (respective different colors), respectively (Col. 18, lines 29-33).

Regarding claim 7, Reynolds teaches that the mixing devices comprise first, second, and third incoherent bundles (plurality of plastic optical fiber elements) of individual optic fibers, each bundle having an input end (receive light) and an output end (transmit light) (Col. 2, lines 25-27). In addition, Reynolds teaches that the fibers may be made of coated plastic (Col. 6, lines 28-29).

Regarding claim 8, 9, and 10, again, Reynolds teaches that the mixing devices comprise first, second, and third incoherent bundles (plurality of plastic optical fiber elements) of individual optic fibers, each bundle having an input end (receive light) and an output end (transmit light) (Col. 2, lines 25-27). The composite common output end (combines end portion) of the bundles additively combine (comprises the ends of the optical fiber elements) the different colored lights (first, second, and third LEDs) as they are transmitted from the composite output end (Col. 3, lines 30-33). In addition, Reynolds teaches that the fibers may be made of coated plastic (Col. 6, lines 28-29). Furthermore, Reynolds teaches that the three bundles are incoherent in nature - that is to say that they are formed by a plurality of individual fibers that are interwoven (spatially intermixed) along their length in a random manner to form the bundle (Col. 6, lines 33-37).

Regarding claim 11, Reynolds teaches that the three bundles are incoherent in nature - that is to say that they are formed by a plurality of individual fibers that are

interwoven (distributed) along their length in a random manner (randomly) to form the bundle (Col. 6, lines 33-37), and that the output end of the bundles additively combines the different colored lights (combines the light from the LEDs transmitted therefrom) (Col. 3, lines 30-33).

Regarding claims 13-15, Guy teaches that in the coupling assembly the light guide is placed next to the light emitting surface of the solid-state light source and the light guide is bonded to the light source (bonding an end of the associated optical fiber to said surface) (Paragraph [0009], lines 4-6). In addition, Guy teaches that the LED's plastic dome (Fig. 1, item 114) may be drilled (cut) to form a hole (item 116) of proper dimensions to accept light guide (optical fiber) (Paragraph [0023], lines 3 and 4).

7. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weissman et al. (US 5,984,477) in view of Guy (US 2003/0219207 A1), and further in view of Zavracky et al. (US 5,673,059) and Berman et al. (US 4,859,031).

Regarding claim 16, neither Weissman, Guy, nor Zavracky teach a polarizing structure that is positioned intermediate the optical fiber and the reflective display, said polarizing structure permitting passage of light therethrough having a first polarity and reflecting light of a polarity that is reverse of said first polarity, the light from the optical fiber striking the polarizing structure in instances before and after the light strikes the reflective display, in one instance said light being reflected by the polarizing structure and in the other instance said polarizing structure permitting passage of light therethrough. Berman, however, teaches an optical collimating apparatus for use in a

heads-up device, wherein an image is passed through a circular polarizing filter to the semi-reflective concave mirror (polarizing structure), circularly polarizing the image. The semi-reflective concave mirror transmits (permits passage) the image to the cholesteric liquid crystal element (reflective display), which is polarized in a rotary sense opposite (reverse of first polarity) that of the image, causing the image to be reflected without reversal of its rotary sense, back to the concave side of the semi-reflective concave mirror (the light striking the polarizing structure in instances before and after the light strikes the reflective display). The image is then reflected (and its rotary sense reversed) by the semi-reflective concave mirror back toward the cholesteric liquid crystal element, which transmits the image or images to the observer (Col. 2, lines 8-19). Therefore, viewing the references as a whole, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Weissman, Guy, Zavracky, and Berman for the benefit of providing an image of an object or a plurality of objects optically superimposed in the line of sight of an observer (Col. 1, lines 62-64).

Regarding claim 17, Berman teaches that the semi-reflective concave mirror transmits (permits passage of some of the light) the image to the cholesteric liquid crystal element (to strike the reflective display), causing the image to be reflected without reversal of its rotary sense, back to the concave side of the semi-reflective concave mirror. The image is then reflected (reflecting said light after it is reflected off the reflective display) by the semi-reflective concave mirror back toward the cholesteric liquid crystal element (Col. 2, lines 8-19).

8. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weissman et al. (US 5,984,477) in view of Guy (US 2003/0219207 A1), and further in view of Zavracky et al. (US 5,673,059), Reynolds (US 3,825,336), and Berman et al. (US 4,859,031).

Regarding claim 18, neither Weissman, Guy, nor Zavracky teach a polarizing structure that is positioned intermediate the optical fiber and the reflective display, said polarizing structure permitting passage of light therethrough having a first polarity and reflecting light of a polarity that is reverse of said first polarity, the light from the optical fiber striking the polarizing structure in instances before and after the light strikes the reflective display, in one instance said light being reflected by the polarizing structure and in the other instance said polarizing structure permitting passage of light therethrough. Berman, however, teaches an optical collimating apparatus for use in a heads-up device, wherein an image is passed through a circular polarizing filter to the semi-reflective concave mirror (polarizing structure), circularly polarizing the image. The semi-reflective concave mirror transmits (permits passage) the image to the cholesteric liquid crystal element (reflective display), which is polarized in a rotary sense opposite (reverse of first polarity) that of the image, causing the image to be reflected without reversal of its rotary sense, back to the concave side of the semi-reflective concave mirror (the light striking the polarizing structure in instances before and after the light strikes the reflective display). The image is then reflected (and its rotary sense reversed) by the semi-reflective concave mirror back toward the cholesteric liquid crystal element, which transmits the image or images to the observer (Col. 2, lines 8-19). Therefore, viewing the references as a whole, it would have been obvious to one of ordinary skill in the art at the

time of invention to combine the teachings of Weissman, Guy, Zavracky, and Berman for the benefit of providing an image of an object or a plurality of objects optically superimposed in the line of sight of an observer (Col. 1, lines 62-64).

Regarding claim 19, Berman teaches that the semi-reflective concave mirror transmits (permits passage of some of the light) the image to the cholesteric liquid crystal element (to strike the reflective display), causing the image to be reflected without reversal of its rotary sense, back to the concave side of the semi-reflective concave mirror. The image is then reflected (reflecting said light after it is reflected off the reflective display) by the semi-reflective concave mirror back toward the cholesteric liquid crystal element (Col. 2, lines 8-19).

9. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weissman et al. (US 5,984,477) in view of Guy (US 2003/0219207 A1), and further in view of Zavracky et al. (US 5,673,059) and Johnson (US 5,719,588).

Regarding claim 21, neither Weissman, Guy, nor Zavracky teach a diffusion screen being placed between the reflective display and optics, which transmit the image to the viewing portion of the device. Johnson, however, discloses that a light-transmitting randomizing or diffusion screen (item 16) may be disposed in front of each LCD screen (item 12), i.e. between the screen (item 12) and the respective optical system (item 14) (Col. 2, lines 35-38). Therefore, viewing the references as a whole, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Weissman, Guy, Zavracky, and Johnson for the benefit of avoiding

disturbing effects on the user's vision, of exposure of the eyes for long periods to entirely pixelated fields of view, and affording a more acceptable viewing impression to the user (Col. 2, lines 32-35).

10. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weissman et al. (US 5,984,477) in view of Guy (US 2003/0219207 A1), and further in view of Zavracky et al. (US 5,673,059) and Spitzer et al. (US 6,724,354).

Regarding claims 22 and 23, neither Weissman, Guy, nor Zavracky disclose a reflective liquid crystal image field or a reflective active matrix liquid crystal display overlaying a reflective surface. Spritzer, however, discloses a facemask display system, which utilizes a reflective (reflective surface overlaid by) AMLCD (active matrix liquid crystal display, Col 3, line 61). Therefore, viewing the references as a whole, it would have been obvious to one of ordinary skill in the art at the time of invention combine the teachings of Weissman, Guy, Zavracky, and Spritzer for the benefit of offering uniform and efficient illumination, with less weight and volume than prior art systems (Col. 2, lines 41-43).

11. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weissman et al. (US 5,984,477) in view of Guy (US 2003/0219207 A1), and further in view of Zavracky et al. (US 5,673,059) and Hansen et al. (US 4,170,399).

Regarding claims 25 and 26, neither Weissman, Guy, nor Zavracky disclose the LED being bonded to the plastic optical fiber by an adhesive having a refractive index that is between that of the LED and the plastic optical fiber. Hansen, however, discloses an LED fiber optic connector, wherein the epoxy used to bond the members together has an index of refraction on the order of 1.50 to 1.55 compared to 1.49 for the fiber and 3.5 for the chip (adhesive having a refractive index that is between that of the LED and the plastic optical fiber) (Col. 4, lines 37-40). Therefore, viewing the references as a whole, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Weissman, Guy, Zavracky, and Hansen for the benefit of providing coupling between the LED and the fiber (Col. 4, line 41).

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eli Sheets whose telephone number is (571) 272-6532. The examiner can normally be reached on M-F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vu Le can be reached on (571) 272-7332. Customer Service can be reached at (571) 272-2600. The fax number for the organization where this application or proceeding is assigned is (571) 273-7332.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VU LE
SUPERVISORY PATENT EXAMINER